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10/620,895	07/16/2003	Akshey Sehgal	SCP-9410	8934
28584	7590	01/04/2005	EXAMINER	
STALLMAN & POLLOCK LLP SUITE 2200 353 SACRAMENTO STREET SAN FRANCISCO, CA 94111			CARRILLO, BIBI SHARIDAN	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 01/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/620,895

Applicant(s)

SEHGAL, AKSHEY

Examiner

Sharidan Carrillo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/08/2004 08/15/2004, 12/22/2003
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-45 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The limitations of "at a substantially single pressure" and "high dipole moment solvent" are not taught by the specification as originally filed. Page 17, lines 9-11 teaches the pressure chamber is not depressurized between application of the first and second co-solvent mixture. The specification fails to teach "the co-solvent mixture dissolving the photoresist material in a substantially layer by layer manner at a substantially single pressure".

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite because it is unclear what is meant by "high dipole moment solvent". Claim 1 is further indefinite because it is unclear whether the limitations of

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dissolving bonds, whereby the accelerator is selected to increase a rate of removal of the photoresist, whereby the co-solvent mixture dissolves the photoresist material in a substantially layer by layer manner at a substantially single pressure is a property of the composition or whether the limitations are considered as positive process limitations. Additionally "layer by layer" is indefinite because there is no positive recitation of the photoresist material having multiple layers. Claims 3-6 are indefinite because "the carbonate" lacks positive antecedent basis. Claims 7-13 are indefinite because it is unclear what is meant by "high dipole moment solvent". Claims 31-32 are not further limiting since claim 1 recites removing photoresist material.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-7, 9, 13-14, 17-18, 20-24, 27, 29-32, and 45 are rejected under 35 U.S.C. 102(e) as being anticipated by Xu et al. (US2003/0125225).

In reference to claims 1-7 and 9, Xu et al. teach removing photoresist by treating with a supercritical fluid in combination with a carbonate co-solvent, an oxidizing agent, and an accelerator (i.e. surfactant or chelating agent).

In reference to claims 13-14, refer to paragraph 29. In reference to claims 17-18, and 27, refer to paragraph 47. In reference to claim 20, refer to paragraph 46. In reference to claim 21, refer to paragraphs 11 and 46. In reference to claims 22-23, paragraph 47 teaches dithiocarbamate. In reference to claims 24, 29 and 30, refer to paragraph 45. In reference to claims 31-32, refer to paragraph 6.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (65005605) in view of Xu et al. (US 2003/0125225).

In reference to claims 1 and 45, Mullee et al. teach removing photoresist from a substrate using supercritical fluid in combination with an amine and solvent.

In reference to claim 1, Mullee et al. fail to teach an oxidizing agent. Xu et al. teach oxidizing agents for enhancing removal of photoresist. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include the addition of oxidizing agents, as taught by Xu et al., for purposes of enhancing photoresist removal. It is prima facie obvious to combine two compositions, each taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose (In re Kerkhoven, 205, USPQ 1069, 1072). In reference to claim 2, refer to the abstract of Mullee et al.

In reference to claims 3-4 and 9, Mullee et al. teach ethylene or propylene carbonate. Mullee et al. fail to teach butylene carbonate. Xu et al. teach conventional co-solvents include butylenes, ethylene, and propylene carbonate and mixtures thereof. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include homologs of equivalent carbonates, as taught by Xu et al., for purposes of performing the same function.

In reference to claims 5-7, refer to col. 4, lines 45-49 of Mullee et al. In reference to claims 13-14, refer to col. 9, lines 30-35. In reference to claims 17-18, refer to col. 4, lines 45-49. In reference to claims 20-21, refer to col. 6, lines 29-30.

In reference to claims 22, 27, and 29-30, Mullee et al. fail to teach the addition of a salt, glycol, or alcohol. Xu et al. teach chelating agents, alcohols (paragraphs 45, 47), for purposing of enhancing photoresist removal.

It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include alcohols and salts, as taught by Xu et al., for purposes of performing the same function.

In reference to claim 24, refer to col. 6, lines 21-41 of Mullee et al. In reference to claims 31-33, refer to the Abstract. In reference to claims 34-35, refer to col. 8, lines 9-27. In reference to claims 36 and 42, refer to col. 6, lines 11-15. In reference to claim 37, refer to col. 4, line 30-35. In reference to claim 38, refer to col. 2, line 50-52. In reference to claims 39-40 refer to col. 3 lines 30-45. In reference to claim 40 and in view of the indefiniteness as previously described, the limitations are met by Mullee et al. In reference to claim 43, it would have been obvious to a person of ordinary skill in the art to modify the method of Mullee et al. to include removal of post-ash residues since Mullee et al teach using the method for removal of residue from the substrate surface. In reference to claim 44, refer to col. 4, lines 30-37.

10. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 9 above, and further in view of Bhatt et al. (5637442).

Mullee et al. teach the invention substantially as claimed with the exception of benzyl alcohol. Bhatt et al. teach it is conventional to include organic solvents such as benzyl alcohol in combination with supercritical fluid for etching wafer surfaces. It would have been obvious to a person of ordinary skill in the art to have modified the method of

Mullee et al. to include benzyl alcohol, as taught by Bhatt et al., for purposes of performing the same function.

11. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 9 above, and further in view of Marquis et al. (6040284).

Mullee et al. as modified by Xu et al. teach oxidizing agents, but fail to teach hydrogen peroxide. Marquis teaches strong oxidizing agents such as hydrogen peroxide, having a concentration of 30-50% for purposes of enhancing stripping of the substrate and miscibility with carbonate present in the composition. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include hydrogen peroxide having a concentration of 30-50%, as taught by Marquis et al., for purposes of enhancing the cleaning performance of the composition and to further improve the solvency of other components present in the composition mixture.

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 9 above, and further in view of Honda (6413923).

Mullee et al. teach the invention substantially as claimed with the exception of formic acid. Mullee et al. teach acetic acid. Honda teach formic and acetic as equivalent acids for removing residue from the wafer surface fluid for etching wafer



surfaces. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to substitute equivalent acids, such as formic acid, as taught by Honda et al., for purposes of performing the same function.

13. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 9 above, and further in view of Gotkis (6328042).

Mullee et al. teach the invention substantially as claimed with the exception of the limitations of claim 23. Gotkis teaches cleaning wafer surfaces using various types of solvents such as ammonium carbonate, the solvent being dependent on the type of contaminant present (col. 4, lines 10-30). It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to the addition of conventional solvents, such as ammonium carbonate, as taught by Gotkis, for purposes of performing the same function.

14. Claims 25, and 27-28 are is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 9 above, and further in view of Davenhall et al. (6403544).

Mullee et al. teach the invention substantially as claimed with the exception ether and propylene glycol. Davenhall et al. teach (col. 7, lines 55-65), the addition of additives such as propylene glycol methyl ether to the supercritical fluid for purposes of enhancing the cleaning process. It would have been obvious to a person of ordinary

skill in the art to have modified the method of Mullee et al. to include additional additives, as taught by Davenhall et al., for purposes of enhancing the cleaning process.

15. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 9 above, and further in view of DeYoung et al. (6669785).

Mullee et al. teach the invention substantially as claimed with the exception of the antireflective coating. DeYoung et al. teach that cleaning a substrate having an antireflective layer using a composition comprising a supercritical carbon dioxide in combination with co-solvents such as carbonates and an amine. It would have been obvious to have applied the method of Mullee et al. to cleaning of an antireflective layer since DeYoung et al. teach the using the same composition of Mullee et al. to clean photoresist, antireflective layers, ash residues and other contaminants from the wafer surface.

### ***Response to Arguments***

16. Applicant argues that claim 1 is not anticipated by Xu since Xu recites a list of active agents. Applicant's arguments are unpersuasive since one of ordinary skill in the art would rely on the teachings of the reference as a whole. Specifically Xu clearly teaches a method of removing photoresist using supercritical fluid based composition which include co-solvents, surfactants, chelants and chemical reactants.

17. Applicant argues that Xu fail to teach a substantially single pressure or oxidizers

that dissolve the bonds in the photoresist and the co-solvent mixture dissolving the photoresist layer by layer. Additionally, in paragraph 59, Xu teaches dissolving layers or residues or coatings from the substrate surface. Applicant's arguments are unpersuasive in view of the indefiniteness as previously discussed above. It is unclear whether dissolving the photoresist layer by layer at a substantially single pressure is a property of the co-solvent or whether it is a positive step of the process limitations. Therefore, since Xu teaches the same composition as the instantly claimed invention, the limitations are met by the teachings of Xu.

18. Applicant further argues that Xu fails to teach an accelerator selected to increase the rate of removal of photoresist. Since Xu teaches the instantly claimed composition, the limitations are inherently met by the prior art.

19. Applicant argues that Mullee do not teach or suggest using an oxidizer or teaches dissolving the photoresist material using a co-solvent mixture comprising a high dipole moment solvent, oxidizer and accelerator. The secondary reference of Xu is relied on to teach the oxidizer. Specifically, it is the combination of Mullee in view of Xu which renders the claim obvious. In reference to dissolving bonds in the photoresist material, rate of removal of the photoresist, and dissolving the photoresist material in a substantially layer by layer manner at a substantially single pressure, the limitations are indefinite because it is unclear whether the above limitations are a property of the composition or a positive method step. Since the teachings of Mullee in view of Xu teach the claimed composition, the limitations are met by the prior art.

20. Applicant argues that Bhatt fail to teach dissolving cross-linked bonds in the

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photoresist material in a layer by layer manner at a substantially single pressure. Bhatt is relied upon to teach the conventional use of organic solvents in combination with supercritical fluid for etching wafers. The above limitation is met by the teachings of Mullee et al. for the reasons recited above.

21. Applicant argues that Marquis is directed to stripping paint and is therefore non-analogous art. Applicant's arguments are unpersuasive since applicant's own specification cites the teachings of Marquis. Additionally the composition of Marquis is used for not only paint stripping but for coating removal. Applicant argues that Marquis, Honda, Gotkis, DeYoung, or Davenhall fail to teach exposing the substrate to a co-solvent mixture comprising a high dipole moment solvent, an oxidizer, and an accelerator, wherein the oxidizer is selected to dissolve bonds in the photoresist material and the accelerator is selected to increase a rate of removal of the photoresist and whereby the co-solvent mixture dissolves the photoresist in a substantially layer by layer manner at a substantially single pressure. The above limitations are met by the teachings of Mullee et al. in view of Xu for the reasons recited above since the combined references teach the claimed composition and it is unclear whether the above limitations are a chemical property of the composition or a positive process limitation.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharidan Carrillo whose telephone number is 571-272-1297. The examiner can normally be reached on Monday-Friday, 6:00a.m-2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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